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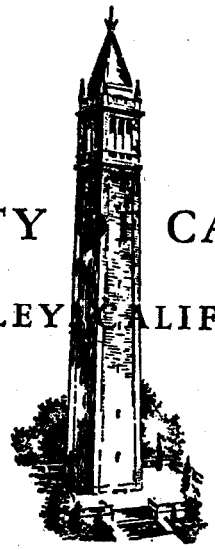

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A NOTE ON EQUILIBRIUM SYSTEMS FROM A DIALECTICAL (TENSIONAL) POINT OF VIEW

by

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A NOTE ON EQUILIBRIUM SYSTEMS FROM A DIALECTICAL (TENSIONAL) POINT OF VIEW

A previous paper (14) outlined an Equilibrium System as a very general system form of which feed-back system and input-output system are special cases. Components of this Equilibrium System are four: Elements, States, Modifications and Relations. Advantages of examining E. systems in which the notion of elements does not appear are referred to. Even in physics, which historically has been the science of elements par excellence, this notion is rapidly losing out to the conceptions of states, modifications and relations.

When one passes to the behavioral sciences the notion of elements (or parts) rapidly loses relevance. States, modifications and relations gain correspondingly in significance. Moreover, since behavioral science investigation rarely if ever involves a system coming into existence from the beginning, the initial state in question is usually fully developed at the moment of the investigator's intrusion. The system at that moment can thus more easily be looked at as a system more or less in equilibrium.

An equilibrium system is regarded as a very general system form. Feed-back systems are special cases of equilibrium systems; and input-output systems are special cases of feed-back systems. In behavioral studies it is assumed that feed-back systems have only limited use. This is even truer of input-output systems without feed-back.

In the previously mentioned paper (14), I pointed out that the major advantages of an Equilibrium System model over more specialized forms is that it gives the investigator an opportunity to study the system as a whole without attending to artificial parts, components or elements. This method starts with the whole system (7), assigns an equilibrium state and then watches for a time the oscillations of the real system about the assumed equilibrium state.

At this point, near the beginning of the investigation, the researcher may usefully employ the Observational Model detailed in Chapter Two of the study by Dr. Strickland and myself in "The Legal Structure of a Confined Micro-society" (15), with changes made as dictated by the nature of the system to be studied and the purposes and methodological biases of the specialists undertaking the study. Reference is here made to Appendix I of this paper for a fuller account of an Observational Model in behavioral investigation.

I should like now to extend the notions contained in these previous papers by considering Equilibrium Systems from a philosophical point of view, that of the philosophy of Hegel (16). This philosophical system is primarily a dialectical one. It assumes that all systems and sub-systems are in a constant state of tension, that the tensions produce the dynamism which makes systems operative, and that the tensions presuppose discernible states of opposition or contradiction, which in turn produce change. C. W. Churchman (6, 11, 12) is at present working on Hegelian Inquiring Systems, and since he and I have been in intermittent communication on the Hegelian philosophy over a great number of years, it may be expected that these remarks will be in the same general tenor as Churchman's more

extended studies.

It is obvious that input-output, feed-back and equilibrium systems are systems in a state of tension. Even in the very simplest input-output system, let us say one representing energy into and energy out of a black box, the opposition or tension between input and output is present though it may be kept strictly at an intuitive or even unconscious level. One merely observes, as the saying goes. But since a mere random observation of the state of such a system could hardly even be specified, it is evident that the usual observations on such a system have some purpose. And it is hard to imagine any purpose which would not include a comparison between input and output at a given moment of time and a judgment of the performance of the system in terms of some norm or other however unformulated. But a comparison of input and output puts these bare magnitudes into a state of opposition or tension. Input is judged high, low or medium relative to output in some way or other. Anything at all we may think about the system puts these two principal components into opposition. Hegel would say this is the nature of thinking. It begins with unformulated or unconscious thought whose material it sees as in a state of tension. At this stage of the inquiry, the mind ignores the black box. The box is indeed black.

The notion that input-output systems are linear or uni-directional is a severe constraint upon them and is adhered to only at the cost of ignoring the inherent opposition or tension. Depending upon one's purpose, this price may not be too high, for the results such systems afford may be precisely the ones sought after. Thus, the process by which the Federal government feeds money into a State Public Health Agency and the amounts

which the state agency feeds out to local units may be all that one is interested in. That this process is too severely constrained to yield interesting results was the early conclusion reached by David Stimson in his study on Decision Making and Resource Allocation in a Public Health Agency. (Internal Working Paper No. 18, Revised, July 1966, Space Sciences Laboratory, University of California). Still this elementary process is often a vital necessity.

When we move to the next higher level of generality, we come upon the notion of a feed-back system. Although all feed-back systems are input-output systems, the reverse is not taken to be the case. In feed-back systems the idea of opposition is consciously built into the model. Indeed, in these systems, there is built in (or should be built in) a dual opposition. In most input-output systems today there is at least a dim realization that feed-back is something to be taken account of. But unless the notion of feed-back is specifically attended to, its conception is generally too confused or too diffuse to warrant the term feed-back. A proper feed-back system should take account of the real difference between positive and negative feed-back. One is not the other with its sign changed. Positive feed-back is in opposition to its "fed-back" in a different sense from that attending negative feed-back. For example, if an out-put of the system is ideas (as in a research organization) a feed-back to an input of ideas is very apt to change the input in character, and a positive feed-back of this nature is apt to be qualitatively different from a negative feed-back. Again, even if the feed-back is an alleged quantified element such as money, it is easy to see that if its effect is negative on the flow of funds (say, from some outside source), the result is again apt

to be different dialectically from positive feed-back. True servo-mechanisms are rarely come upon in behavioral investigation.

In this paper I shall consider that the E-System to be described contains Input-Output Subsystems, Feed-back Subsystems and Decisional Subsystems. The notion of a Decisional Subsystem will be explained at length.

Input and output components of systems and their attendant feed-back aspects are sometimes thought of as operating from the outside or from the environment of the system, though patently this need not be so. On the other hand, when we come to the next notion of equilibrium system organization we are inside the system. This notion is that of Decisional Subsystems. Such subsystems are set up in dialectical fashion. One looks for two or more components of the subsystem in dynamic opposition to one another. The product of such a subsystem is a decision, consciously or unconsciously made. The whole system is to be thought of as operating with these Decisional Subsystems, together with external and internal subsystems of an input-output or feed-back character. Decisional systems are on the third level of generality. They therefore include the idea of the other two but the converse is not necessarily so. Feed-back systems do not contain a true decision maker as an inherent part of their notion. They have a "governor," which operates within a morphological class of permitted limits, but their decision maker is outside the system. For example, the amount of federal money a state dispensing agency gets may have a feed-back effect on the amount of state money it gets. But the question of who gets what will require a Decisional Subsystem. On the other hand, a thermostat does not have a decision maker as a necessary element of the system. The decision maker is "outside" the thermostatic system.

There is another important difference between a feed-back subsystem and a decisional subsystem. In a feed-back system, the components are in more or less mechanical opposition to one another, the major qualitative difference being that between positive and negative feed-back. But in a Decisional Sub-system, the whole idea of the system is a complete inter-penetration of opposed ideas, feelings, effort and even effect. These systems are completely dynamic and decisional. For example, in a university research model, we have teaching faculty "opposed" to research faculty; research faculty "opposed" to research personnel; research personnel "opposed" to service personnel, and so forth. There is no notion that one of these opposites could be suppressed in the interests of the other, that one is better than the other, or that one is free to regard the two opposing elements as polar opposites which give rise to a preferred as against an unwanted directionality. This subsystem must have a real though not necessarily a personal decision maker.

At the next level of generality we come upon the Equilibrium System itself. Its notion includes all the previous subsystems, though not vice versa. The notion of equilibrium is not part of the meaning of such subsystems, though of course any of them may be in equilibrium in some sense at any time. The point is, they do not have to be. And herein lies the great advantage of the notion of equilibrium. It matters not how complicated the interactions of the environment and the internal components with the whole system and among themselves, the idea of equilibrium washes out these differences and presents a relatively simple reading in its stead. Great skill may be required in devising an adequate conceptual equilibrium model, but if one is fortunate enough to get it operating many other

conceptual difficulties may be by-passed.

It must be borne in mind that in utilizing an equilibrium model, the recommendation is to proceed in the reverse order to the progression of generality outlined above. One starts with the equilibrium system itself, passes on to the Decision Sub-systems only if necessary, and thence to the feed-back sub-systems and finally to the input-output sub-systems. The whole of the above is a static conceptual exercise of an empirical character. It is hard to see how it would suffice for anything other than a beginning in model building. To be of any use, the static model must then be made dynamic. This is the final oppositional or dialectical system. It is a system embodying a Norm of Progress. Reflection on the needs of this system discloses the fact that not equilibrium but disequilibrium may be a necessary condition by which to measure system performance and progress (or retrogression). One may even postulate that if left to itself the equilibrium system will tend to degrade, vis à vis a Norm of Progress initially postulated whether in or out of equilibrium. This is a metaphor akin to the notion of entropy. Of course none of these notions have meaning except in the light of a goal. Definition of such a goal is the first task of an investigator interested in the progress or degradation of such systems.

In a sense, the notion of equilibrium is a morphological conception according to the Churchman-Ackoff Psychologistic Inquiry Model (1-13). A brief interpolation may be helpful here. The Psychologistic Model envisages a progression of states of the universe from the mechanical, to the physical, to the morphological, and finally to the teleological or purposive. In these terms there is a rough analogy between a mechanical state

and an input-output system in which severe constraints are placed on all aspects of the system except the black box. A simple cause-effect relationship is assumed. The inputs are the observed "causes," the outputs are the observed "effects." Further, all the components of the input-causes are linearized, by strong-arm methods if necessary. The output effects are seen as "naturally" linear. That is, some linear process is taken to be the normal or natural output. All other "effects" are ignored or made subservient to the main output. This mechanical model proves itself inefficient or insufficient in the light of scientific purposes. According to the C-A-P model, it is seen that the classes of states actually dealt with are really physical, at least. That is, the elements of the classes of states studied are not points, but vectors (to put the matter very briefly). Thus, it is apparent that the vectors must form a morphological class. That is, the classification must allow tolerance limits as to what is to be included in or excluded from a given class. For example, the notion of a feed-back system demands at least a morphological classification. Instantaneous adjustments could entail devastating oscillation. When we come to the Decisional Subsystems, the C-A-P requires a teleology, as do all decisional frameworks. In C-A-P, the Decisional Subsystems would be studied as follows. The Decisional Subsystem could be taken as an Individual, the rest of the E-system could be described as its Environment. The notion of equilibrium is not included in this model. But successive equilibrium states could be viewed in a Norm of Progress to be defined in terms of a utility function assigned as that of the decision maker.

This thumb-nail sketch of the application of C-A-P to the study of an E-system is of course purely a suggestion. Any other formal model of a system in action would do.

It ought to be apparent that an E-system can stand as much mathematical sophistication as the researcher desires and is capable of. However, the main advantages of E-systems would be lost if their relative simplicity is sacrificed either to formalistic or to mathematical concerns. This is to say that primarily an E-system is a descriptive, qualitative model. For greatest economy, the In-put, Out-put and Decisional Subsystems should be described in such a way as to bear mainly on the morphological notion of the equilibrium of the whole system. This last is the most important use to which an E-system can be put. One disregards the reasons for disturbances of the whole system and merely looks at these disturbances themselves. And even if it is desired to describe and to observe the system in action along a progress-retrogression continuum this too should be done at first in a relatively descriptive and qualitative manner. Only then should a complex measurement model such as C-A-P be imposed. Needless to say, if mathematical rigor is desired beyond that normally available to decision models (as in econometrics, game theory or decision theory in general) it might be necessary to restrict the E-system to the study of physical systems.

The thinking outlined here tends to downgrade input-output and feedback systems. It also disregards the mechanics of decision in the Decisional Subsystems, and concentrates on perturbations in the whole system. Needless to say, as indicated above, there is nothing to prevent one from studying these subsystems more intensively if desired. For example, the

Decisional Subsystems could use a Freudian root-metaphor. One could look for a Super-ego effect in opposition to an Id effect and call the decision maker the Ego. The super-ego would represent the demands of the culture, of ethics, of professional responsibility, of the "image," of seemliness and other idealistic motivations and goals. The Id represents the realistic intrinsic demands such as those for money, prestige, office, appurtenances, subordinates, secretarial services, travel, and miscellaneous advantages and preferences. The decision maker is the Ego whose function is to keep this subsystem in a state of tension and to resolve it periodically by means of "defense mechanisms" or other mediating, conciliating or adjudicatory devices. This metaphor would enable one to disregard elements of the system ordinarily viewed in individualistic or even personalistic terms. The Dean, the administration, the faculty, the research group, or the manager, the supervisor, the workers are disregarded and forces at work for "idealism" as opposed to crass "realism" are looked for. The mechanism of resolution then becomes the important focus of attention. Not how the conflict arose, but what was done about it is the main point. This approach is available and would be helpful only in complex behavioral systems where a heavy premium is put upon simple or even simplistic methods of observational and empirical research.

A note on the roles of information and communication: In input output and feed-back systems, <u>information</u> is a vital function. The systems do not communicate and do not need communication. They need and they produce information. In Decisional Subsystems, the need for communication increases and the need for information decreases. These two processes are in dialectical opposition. The more information, the less communication.

A decision maker needs to have information compressed, summarized, destroyed if necessary, in order to reduce its magnitude. This process enables communications to get through which in their turn become compressed during the decision process and absorbed in the decision. Only the decision as it affects the equilibrium of the whole system is of consequence. Emphasis upon decision downgrades information to mechanical processes. Its sheer bulk is a serious handicap to decision. Information must be filtered first for relevance and then for handle-ability. Compressed, it becomes relevant communication. Then even communication must be destroyed, absorbed in the decision.

The E-system emits information. It does not communicate. Such information must then be changed to communication in order that the Dynamic System of Progression or Retrogression with respect to a goal or utility may operate. This Normative System may in its turn be merely linear, feedback, Decisional with respect to a larger E-system, or an E-system in itself.

The implications of the above analysis of E-systems for experimental work are obvious. After the Observational Model has given one sufficient feel for the system, experimental intrusion at various points of the system are possible and an over-all model of system performance may be devised.

A further note on Decisional Models. Such a model uses the same process of jamming diverse components together as is done in an input-output system. In the latter everything "going into the system" is jammed together as input. Everything "coming out" is output. The process is linear. Numerical analysis is the typical mathematics. No dynamics among the components is assumed. In feed-back systems, the obliteration of

differences takes the form of assuming that all relations between feed-back and fed-back are bi-quadratic and additive. In decision models the obliteration is most severe and most complex. Everything impinging on the decision is subsumed under a simple binary form: yes or no. If decision is apparently multiform, this is taken to be a number of binary decisions, some of which may be no-decisions, which again are reducible to either yes or no depending upon the status of the decision question.

In large-scale behavioral systems, inputs and outputs are either hard to handle, or if easy, they do not tell much. Compare inputs and outputs in connection with a large system such as a University, or a Government agency or a large corporation. Inputs diffuse into a complex organism that utilizes them in indefinitely variegated ways. Outputs simply seep away. The Decisional Subsystems are relatively easier to discern. And the equilibrium criterion may even center about one man. The equilibrium criterion may be something as simple as "superficial change." Each disturbance of the equilibrium of the system may be met with changes in classifications, procedures, titles, "re-organization" and the lopping off of unprotected personnel. On the other hand, if all that is desired is the information that a simple input-output system generates, such as in a study of budget allocations, then the Decisional Subsystems may become too complex to attend to, and should be disregarded.

It might be interesting to use a few recent system studies in the Space Sciences Laboratory to illustrate "equilibrium thinking." In the Stimson study referred to above, the author first approaches the question of Decision Making and Resource Allocation in the California State Department of Public Health in terms of an Input-Output model. The following

running quotations illustrate this process.

> The first step in identifying a significant resource allocation problem in the Department was to visualize the Department as a black box with inputs of State and federal money and outputs of funds to local health agencies and services.
>
> . . . . .
>
> Allocation problems connected with State funds were ruled out by the author because of the intricacies of budgetary procedures.
>
> . . . . .
>
> The federal formula grants presented a more feasible area for study because the Department has much discretion in the use of federal funds and because a federal formula grant can be thought of as an exogenous variable in the system encompassing the Department's administration of the grant.
>
> . . . . .
>
> Another set of black boxes (Table 3) was made in which the outputs were the different programs supported by each annual CI&A grant.
>
> . . . . .

The writer concluded that a Decision Model would be necessary in order to handle the dynamics of the situation and this constitutes the heart of the work.

The question of equilibrium criterion, which is usually an empirical and very often intuitive determination proved interesting. Here, the criterion emerged as a result of a thought experiment run in the form of alternative allocations that the department decision making staff could express through questionnaires. Both the first and the second most favorable allocation reduced to following essentially the allocation of the previous year. Here the criterion of equilibrium was detected as a result of an open-

minded attitude on the part of the investigator to the way in which decision was actually made in the organization. The complex behaviors of the input-output subsystems and the decisional subsystems all revolved about the equilibrium factor of the "last year's budget." Stability in the organization was achieved (within limits) not by expressly announcing and consciously following this criterion which would not be acceptable, but by following it nonetheless. The last year's budget, in effect, kept the system in equilibrium. It is of course obvious that most systems contain such stabilizing points, factors or criteria. The difficulty is to find and then to use them.

Another study, the Growth of Organized Research at the Berkeley Campus by Frederick Betz and Carlos Kruytbosch is also illuminating. The authors begin (pages 4-6) with an account of what may be called an Input-Output System. Table I lists "Sources of Funds for Instruction and Research Expenditures," Table II "Proportion of Funds from Various Sources Expended on IDR and OR," and Table III "Expenditure for Organized Research by Source." Budget considerations seem first to induce the idea of input-output. So too do information or communication flow. But soon the decisional subsystems claim attention. Running quotations indicate the concern of the investigators with this leading conception.

> Research projects supported by money coming in under the category of Organized Research represent a range of compromise between the research interests of the faculty and the interests of the funding agencies.
>
> . . . . .
>
> A congressman, a federal agency administrator, a university president, chancellor or trustee, or others may wish to see some project undertaken or area of research developed. These may approach a potential principal investigator directly or indirectly through a university administrator.
>
> . . . . .

> Appointments of Lecturers and Instructors are controlled at the departmental levels.
>
> . . . . .
>
> Also in this context, there are several hundred professional research personnel on the campus who are employed primarily by faculty in organized research units (but also in departments). Though most of these work within the framework of faculty projects, a number of them generate and control their own projects in all but the formal title of principal investigator.
>
> . . . . .
>
> For the purpose of the following description we shall consider the modal relationship to be a direct one between the principal investigator and the federal agency.
>
> . . . . .
>
> The option exists for faculty members to have their research or parts of it administered through outside non-university agencies, and take a full or part-time leave of absence from their university position. Though this does not appear to be a common pattern, it does occur. And it is not uncommon to hear alarm expressed about research being "driven off campus." Reasons for choosing this option are several. A foundation may be undertaking a project of its own that a faculty member wishes to join. Extreme difference of views with a department chairman may lead a faculty member into other channels for obtaining research money. And finally, the notion that he may be able to obtain a larger sum for his research if he applies through an institution which charges the granting agency lower overhead rates is not unappealing to some faculty.
>
> . . . . .

The decision subsystems are not analyzed as such. The study is phenomenological or observational. It would be possible, however, to cast it in the form of an equilibrium model. It contains feed-back sub-systems as well.

> The Deans of Colleges vary in their involvement in the research proposal processing chain. For example, the Dean of Letters and Science has delegated his responsibility for checking proposals to the Graduate Dean. However, the Graduate Dean will refer particular cases of proposals involving a good deal of released time over to the L and S Dean for further inquiry.
>
> . . . . .

> A fairly strict correlation between research moneys and the enrollment of graduate students is maintained.

. . . . .

The equilibrium criterion detected was, surprisingly enough, university space allocation at Berkeley. This economic or geographical factor served to keep the system in equilibrium. "One of the most important commodities on the cramped Berkeley campus is space" (p. 20).

In another report, on Faculty Attitudes Towards the FSM Controversy, by Betz, Churchman, Kruytbosch and Ratoosh, it was seen that what we have been calling the equilibrium criterion was "change." Most faculty members interviewed agreed "on the need for broad changes in university organization and policy" (p. 17). The highly specialized nature of the problem would likely preclude any but an observational model geared to handle an ephemeral social event of great significance. Still the crisis lasted long enough for feed-back and especially for decisional subsystems to emerge. Hence, the question of the utility of an equilibrium model could not altogether be foreclosed. An input-output system, on the other hand, appeared to be patently infeasible because of the extraordinarily heterogenous "influences" brought to bear on the system and because of the totally amorphous and "disintegrated" character of any conceivable output.

APPENDIX I

ASSUMPTIONS OF AN OBSERVATIONAL MODEL FOR BEHAVIORAL INVESTIGATION

1. The behavioral complex to be studied must be capable of observational scrutiny without serious perturbation by the fact of scrutiny. Otherwise, no merely observational model is adequate.

2. The range of observation should be as broad as is tolerable. Judgment should be suspended at first. Methodological problems should be bracketed for future consideration. The method in a word is phenomenological or existential.

3. A full running account or tape of everything that happens should be recorded. A log of events should be kept.

4. The philosophical biases of the investigators should be searched out and taken account of.

a. The rationalistic, axiomatic or deterministic biases. Do the investigators hope to emerge with a series of rational conclusions such as those expected from game theory in which the players strive to maximize a utility function? Or is it assumed that, given certain assumptions, the behavior of the members of the complex can be deduced as "theorems?" Or that despite the illusion of freedom which the members of the complex enjoy, the expected behavior is inevitable and the content of the investigation is an account of their illusion or self-deception? Or

that the model to be adopted is to be taken as authoritative over any data proffered to it? Data which do not admit of ready processing are firmly to be rejected as irrelevant.

b. The empirical bias.

Do data generate their own meaning, so that the facts must stand for themselves, and elaborate efforts to control the investigation merely introduce intolerable complications that make interpretation impossible? In this world view facts are paramount over any model that purports to process them. The model must be altered freely to fit the experiential input.

c. The Aristotelian bias. The four causes.

(1) Is the behavioral complex to be looked at as a substance or material that generates the kind of behavior ordinarily expected of such substances or materials? (The behavioral complex as material cause of behavior)

(2) Is the behavioral complex to be looked at as the efficient cause of the behaviors observed such that changes in the complex would be expected to yield changes in the behaviors in some expectable way?

(3) Is the behavioral complex to be regarded as a conceptual framework so that the behavior emerging conforms to the idea or ideas incipient in the complex at the beginning? (The complex as formal cause of the behavior)

(4) Is the behavior the purpose for which the complex exists and toward which the efforts of the complex converge despite resistance, change or frustration? (The complex as final cause)

d. The Platonic bias.

Is the reality of the behavioral complex taken to be an Idea and the behaviors themselves as merely ephemeral and illusory? Is the behavioral complex essentially an ethical concept? a political ideal? an economic construct? Is the complex merely the aggregate of its individual members "writ large"?

e. The Kantian bias.

Are model and data taken to be equally important? Is the model taken to be developable without reference to the data, or at least certain very general aspects of the model (the a priori)? And are the data viewed in some sense as independent of the model--at least its more specialized aspects (the a posteriori)? And is it assumed that though both aspects are separable in thought, that data without a model is blind and a model without data is empty?

f. The Hegelian bias.

Are model and data such thoroughly interwoven opposites in a state of tension that observation is essentially a resolution of opposites, a decision, perhaps? Is the complex to be analyzed as a tensional system? The model itself as another? And the whole to be swept into a larger dialectical system, with thought as the leading function of observation and the widest possible concept as the end of self-conscious reflection in which the investigator is just as much a part of the investigation as is the investigated?

g. The Pragmatic bias.

Is the behavioral complex nothing in itself and everything in what it does? Is its value to be judged solely by its consequences? Are

the means the complex uses to get its work done to be judged by the utility of the consequences and, conversely, the character of the consequences to be viewed in the light of the means taken to achieve them?

h. The Existentialist bias.

Is the scientific approach to the behavioral complex really all wrong, so that no attempt should be made to impose upon it any model whatever? Should the complex be allowed to tell its own story, which essentially is aesthetic and neither moral nor scientific?

5. Methodological assumptions should be framed and decisions made.

a. What structure will eventually be imposed on the data?

(1) Qualitative and descriptive only?

(2) Quantitative--what sort?

(3) Statistical--what kind of model? For example, the Churchman-Ackoff Psychologistic Model, Ackoff Psychologistic Model?

(4) Experimental--anticipates intrusion upon the complex for the purpose of generating responses not otherwise to be expected in the ordinary life course of the complex?

(5) Observational--Equilibrium Model? (detailed in this paper)

6. Methodological postulates should be framed and distinguished from hypotheses and proto-hypotheses postulated. These are general guidelines governing the study. They are not expected to change during the course of the study. Hypotheses are critical propositions whose testability is both feasible and desirable. Proto-hypotheses need more work to make them hypotheses. Postulates should be formulated with the specific

behavioral complex to be studied in mind. Needless to say this also applied with respect to what might turn out to be hypotheses, proto-hypotheses and self-fulfilling predictions. The following brief outline of this matter taken from the study called "The Legal Structure of a Confined Microsociety" illustrates the process. The purpose of the study was to develop an observational model for detecting the rules by which a small group of subjects, confined for the purpose of study of nutritional levels, actually governed itself.

A PRIORI ASSUMPTIONS AND PROTO-HYPOTHESES

The following set of assumptions were explicitly made about the nature of our particular inquiry. (The Legal Structure of a Confined Microsociety, pp. 3-11)

1. We assume that law means the assemblage of all behavioral rules that constrain those subject to them to obedience under sanctions either of a positive character in the nature of reward or of a negative character in the nature of punishment.

2. We assume that all special societies develop special legal structures over time.

3. We assume that a society tends to establish legal structures in accordance with the avowed or latent purpose of the society. This is an assumption following as an inference from a general teleological philosophical bias.

4. We assume that the members of a society exhibit both overt and concealed opposition to the general legal structure of the society at any moment.

5. We assume that despite an ever-present disposition to oppose the legal structure, there also exists in the membership of the micro-society a contrary disposition to use the legal structure to advance personal interests.

6. We assume that opposition to or exaggerated support of the legal structure may result from a desire of the members to enhance individual or coalitional goals, or conversely it may result from the members' desire to further the society's major purpose.

7. We assume that the conscious aims of a society are compensated by or in conflict with its unconscious aims.

8. We assume that unacknowledged conscious and unconscious aims result in an actually existing legal structure that is quite different from any acknowledged conscious legal structure. This dialectical situation results in the emergence of what we have called Anti-Law.

9. We assume that a small, confined society places a relatively high premium upon unacknowledged or unconscious Anti-Law.

10. We assume that in a confined society a sharp differentiation between inside and outside legal authority will develop and that consciously contrived Anti-Law attitudes are more likely to be directed against outside than inside legal structures.

11. We assume that the members of a confined society develop a special individual sense of Psychic Space, intrusion upon which is "illegal" within the group.

12. We assume that the members of a confined society instinctively or unconsciously tend to avoid codification of rules to preserve psychic space.

13. We assume that despite the tendency on the part of members of the group to avoid codification of rules designed to preserve Psychic Space, nevertheless observation discloses the existence and the nature of such rules.

14. We assume that the rules governing Psychic Space in a confined society are analogous to the rules of law by which men protect themselves from trespass and other invasions of interests in personality and property.

15. We assume that other objectives of a special confined society are more nearly amenable to conscious choice and decided rule than are intrusions on psychic space.

16. We assume that the legal structure of a confined microsociety cannot collapse or suffer serious degradation without injury to secondary systems of interpersonal control such as morale, good-fellowship, patriotism, scientific or military loyalties, charisma or religious devotion.

17. We assume, despite the critical importance of the legal support system, that it is the first sub-system to suffer serious degradation under environmental stress.

Some of these assumptions are obviously methodological postulates which cannot change much in the course of the investigation since our intention is to be guided by them. Others are proto-hypotheses which investigation may disclose to be inapposite. A fuller discussion of these distinctions is contained in the text of the Report, pp. 1-14.

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